ABSTRACT

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Based on the principles of social learning theory, the purpose of this thesis was to review the clinical procedures commonly applied in the preliminary steps for the establishment of functional speech in non-talking children.

The review focused on the following important preliminary stages of speech therapy:

1. Imitation training, including motor imitation and verbal imitation. The basic assumption was that verbal behavior is initially acquired by imitating the verbalizations of other persons, therefore verbal training must start by teaching the non-verbal child to imitate the relevant stimuli provided by the therapist.

2. Establishment of appropriate contingencies for the child's responses. This step was concerned with a description of the technical procedures through which the child receives positive consequences for desirable behavior and negative consequences for undesirable behavior.

3. Modification of incompatible behaviors occurring in the speech therapy sessions. The unfavorable consequences of the child's maladjusted behavior on the speech training program were discussed, and the procedures for modifying them were reviewed.

4. Establishment and maintenance of the child's attention to relevant teaching stimuli. The clinical procedures used for the establishment of eye contact behavior were reviewed.

5. Systematic observation and recording of behavior. The basic assumption of this step was that the effectiveness or ineffectiveness of treatment procedures is determined by measurement of changes occurring in the child's behavior following the application of such procedures. Therefore, an important component of the speech training program is the observation and recording of the behaviors to be changed. Techniques for observing and recording verbal behavior were described and discussed.

The psychological research reviewed in this paper indicates that children can obtain basic repertoire of words through the systematic application of operant principles in the early stages of speech therapy.

PRELIMINARY STEPS TO THE ESTABLISHMENT OF FUNCTIONAL LANGUAGE IN NON-COMMUNICATING CHILDREN

by

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INTRODUCTION

The clinical application of principles of experimental psychology (behavior modification) has resulted in the successful treatment of many behavioral disorders for which traditional approaches have failed.

One area in which the behavior modification approach has been applied with considerable success is that of speech pathology. Results of recent studies have shown the effectiveness of operant techniques in particular in overcoming severe speech defects and in increasing the rate of verbalizations in children (Brookshire, 1967; Cook & Adams, 1966; Schell, Stark, & Giddan, 1967; Odom, Liebert, & Hill, 1968; Guess, Sailor, Rutherford, & Baer, 1968; Bandura & Harris, 1966; Willson & Walters, 1966; McReynolds, 1966, 1969; Risley & Hart, 1968; Gray & Fygetakis, 1968; Weisberg, 1963; Todd & Palmer, 1968; Stark, Giddan, & Meisel, 1968; Hingtgen, Coulter, & Churchill, 1967; Risley & Wolf, 1967; Guess, 1969; Brigham & Sherman, 1968; Sherman, 1965; Hingtgen & Churchill, 1968; Salzinger, S., Salzinger, K., Portnoy, Eckman, Bacon, Deutsch, & Zubin, 1962; Lovaas, Berberich, Perloff, & Schaeffer, 1966; Garcia, Baer, & Firestone, 1971; Wolf, Risley, Johnston, Harris, & Allen, 1967; Wetzel, Baker, Roney, & Martin, 1966; Jensen & Womack, 1967; Blake & Moss, 1967; Hewett, 1965; Hingtgen & Coulter, 1967; Fineman, 1968; Sloane, Johnston, & Harris, 1968; Lovaas, 1968; Straughan, 1968; Yates, 1970; Hingtgen & Trost, 1966; Isaacs, Thomas, & Goldiamond, 1960; Rheingold, Gewirtz, & Ross, 1959).

The basic assumptions of operant methods for modifying speech deficits may be compared with those of psychoanalysis, the approach which treats the speech problem as a 'symptom of underlying psychodynamic causes'. That is, the speech defect becomes the external expression of 'mentalistic hypothetical constructs', e.g., anxiety. The remedial speech process is thus focused on the manipulation of those 'intrapsychic forces', assuming that the speech 'symptom' disappears upon alleviation of the underlying cause.

In contrast to this approach, behavior modification treats the speech disorders directly. As Sloane & MacAulay (1968) point out, speech disorders are considered to be a product of interactions between the organism, the external antecedents, and the consequences of behavior, as well as the history of such interactions. Behavior modification procedures are based on the manipulation of external contingencies rather than internal psychic forces. In the typical speech therapy situation, the child learns to produce a response, e.g., a verbalization, upon the presentation of a discriminative stimulus such as the therapist's prompt; this response immediately is followed by the presentation of a desired reward or positive reinforcer. Also the child learns to avoid responses which are consequated by the presentation of undesirable consequences or aversive stimulation.

Research on operant behavior in the area of speech has concentrated on language modification and acquisition. At least one writer (Gray, 1970) feels that acquisition cannot be assumed to be due solely to learned behavior based on the imitation of others' verbalizations. In

addition, he believes it involves the establishment of a complex system of implicit responses which represent thinking.

Most of the theoretical explanations provided so far on the failure of language to be acquired by persons who have never spoken are very speculative. As Lovaas et al (1966) point out, "although several theoretical attempts have been made to account for language development, the empirical basis for these theoretical formulations is probably inadequate (p. 705)." In spite of the lack of knowledge of why language is not acquired by some persons, through the judicious application of operant principles it is possible to produce functional verbal behavior in many non-communicating children (Stark et al, 1968; Risley & Wolf, 1967; Guess et al, 1968; McReynolds, 1969; Wilson & Walters, 1966; Sherman, 1965; Hingtgen & Churchill, 1968; Salzinger, S. et al, 1962; Lovaas, 1968; Yates, 1970; Peterson, 1968; Lovaas et al, 1966; Leff, 1968; and Hewett, 1965).

This paper focuses on the preliminary steps of the behavior modification procedures used in the clinical setting for maximizing the occurrence of verbal responses. A review of current research and clinical techniques on speech training with non-communicating children is presented.

The behavior modification approach is based on the general assumption that children first learn to speak by imitation. Therefore, if the child does not have an imitative repertoire before being introduced directly to verbal training, he must learn to imitate. According to Gewirtz (1968) this step provides the antecedent basis for the

"occurrence and acquisition of language responses by the child and for subsequent expansion of his language repertoire (p. 385)."

Imitation training begins with gross motor tasks and later involves fine motor tasks oriented toward the vicinity of the mouth. Still later, when the child has acquired a generalized set of imitative responses involving the mouth, he is taught to imitate vocal sounds.

This review of the preliminary steps to the establishment of functional language in non-communicating children is divided into two parts. The first part consists of those steps considered prerequisites for implementing any speech training program. These include the utilization of effective reinforcers, the elimination of incompatible behaviors, the establishment of attention, and the systematic observation and recording of behavior. The second part involves imitation training and is divided into two sections: the first concentrating on motor imitation, the second on verbal imitation.

PART I

THE REINFORCERS

The crucial role of reinforcing agents for the acquisition and treatment of speech defects has been widely demonstrated in the literature of social learning theory (Lovaas et al, 1966; Lovaas, 1968; Hewett, 1965; McReynolds, 1969; Risley & Wolf, 1967; Wetzel et al, 1966; Hingtgen et al, 1967; Wolf et al, 1967; Bijou & Baer, 1966; Yates, 1970; Sloane, 1968, etc.). Much of the success of behavior modification procedures used with language problems can be attributed to correct manipulation of environmental contingencies. This section examines some of the major principles of reinforcement with which one must be familiar before a language training program can be initiated.

Reinforcers are defined in terms of their influences upon the behaviors that they follow. A reinforcer is any event which alters the rate of emission of a given behavior when it follows such behavior in time.

There are two kinds of reinforcers: positive and negative. If the presentation of a stimulus after the emission of a behavior results in a gain of strength of it, then the stimulus is called a positive reinforcer or a positively reinforcing stimulus. On the other hand, if removal of a stimulus results in a gain of strength of the behavior that it follows, then this stimulus is called an aversive stimulus or a negative reinforcer. Behaviors can be weakened by removing the positive

reinforcers (extinction), or by presenting negative reinforcers following their emission (i.e., punishment).

Food, such as candies or cookies, and water, frequently function as positive reinforcers. Electric shocks, discordant noises, physical restraint, isolation, darkness in a teaching booth, or removal of positive reinforcers, frequently function as negative reinforcers or mild punishment. Speech training with non-verbal children commonly involves the presentation of both positive and negative reinforcers. McReynolds (1969) says, "usually a procedure in which appropriate responses are reinforced while inappropriate behavior is placed under extinction is successful in training speech (p. 199)." In other words, desirable verbal behavior can be acquired and maintained through systematic positive reinforcement, while inadequate responses can be eliminated by the contingent removal of positive reinforcers.

Positive and negative reinforcers also can be grouped as primary or secondary. Primary reinforcers are those environmental events that serve as reinforcers from birth on, because of their biological significance and because they satisfy needs. Food and water are good examples of primary reinforcers. Secondary reinforcers, also called learned, acquired, or conditioned reinforcers, correspond to symbolic rewards or punishments. They appear to be neutral at birth, but acquire reinforcing value as the child develops and interrelates with the environment. Falling within this category are all the forms of social stimulation, for example, approval, smiles, nods, and bodily contact, e.g., patting the child's arms. As pointed out previously, neutral

stimuli may acquire reinforcing power upon being paired with primary reinforcers. For this reason innumerable secondary reinforcers are available for modifying the behavior of each individual.

Lovaas (1968) has pointed out that one might approach the problem of behavioral deviations in terms of distortions in the acquisition of secondary reinforcers. He assumes that normal behavioral development involves the acquisition of a large variety of secondary reinforcers, and that a child's failure to acquire certain secondary reinforcers is related to an absence of the behaviors that usually result in the presentation of those stimuli. He adds,

> In the extreme case of complete failure in the acquisition of such secondary reinforcers, the child should evidence little, if any social behaviors. That is, the child should fail to attend to people, fail to smile, fail to seek your company, to talk, etc., because his environment did not provide him with the rewarding consequences for such behaviors (p. 128).

The above point of view has important implications for the techniques of reinforcement used in verbal training with non-communicating children, since many of these children show a lack of learning with social (secondary) reinforcement, particularly those children labeled autistic, schizophrenic, or mentally retarded.

Social stimulation such as attention and praise might be used to strengthen behaviors in normal children; however, such stimulation frequently acts as very weak positive reinforcement for severely deviant children. With the latter subjects, it is generally necessary to follow social stimulation with a primary reinforcer. Gradually, the schedule of primary reinforcement can be reduced so that the child receives a

social reinforcer after each response and a primary reinforcer only periodically.

Administration of Reinforcers

Following the emission of an appropriate verbal response the therapist immediately provides some form of social reinforcement, e.g., verbalizes "good", "that is good", "good boy (girl)", etc., while extending a bite of food on a spoon or fork directly toward the child's mouth. According to Risley & Wolf (1967) the therapist's giving praise before extending the bite of food toward the child's mouth serves to bridge the time between the appropriate response and the presentation of the reinforcer, making the reinforcing contingency more precise.

Inappropriate verbalizations by the subject can be handled through an extinction procedure: The therapist either ignores the response by turning away from the child, or removes the positive reinforcer. McReynolds (1969) reported a speech training procedure in which the availability of positive reinforcers was withdrawn upon the pronunciation of incorrect verbal responses by children. As a consequence of this technique, the rate of correct verbalizations increased. The procedure was as follows. After an incorrect verbalization the experimenter removed the primary reinforcer (ice cream), turned around in her chair and sat with her back to the child. This negative social reinforcement was terminated upon the emission of the correct response. McReynolds used negative reinforcers after establishing that (1) the child was capable of making the appropriate responses; (2) the child

showed no increase in the correct responses within at least a five minute period; and (3) the actual response consisted of the previous response that had been appropriate before a new phoneme or word was added to the chain.

Most children of all ages tend to respond favorably to candies, thereby making candies perhaps the most universal edible reinforcer. Among the different classes of candies, M & M's are popular among therapists because of the following features: they do not melt readily in the child's hand but do in the mouth; they are available in several attractive colors; they are small, making many of them consumable without satiation; and they are well accepted by children.

When food is used as a reinforcer it should be administered in very small bitesize amounts on a spoon or fork. Thus, rapid satiation and chewing which interferes with speech is avoided. Risley & Wolf (1967) stress that "the ideal food reinforcer is one which the child particularly 'likes', many bites of which can be eaten, and which cannot be readily played with (p. 76)." Water or juice can be administered in small quantities using a small plastic wash bottle.

Whatever the reinforcer, the time elapsing between the emission of the child's response and the presentation of the reinforcer must be as brief as possible. It is well known from experimental research that long delays between the desired response and reinforcement may result in undesirable superstitious behaviors which are increased because they lie in close proximity to the reinforcing stimuli (Catania, 1968 & Herrnstein, 1966). Also, Catania stresses that "a reinforcer becomes

less effective as its delay increases (p. 332)." Undesirable superstitious behaviors are avoided by presenting differentially the reinforcer upon the occurrence of the response of interest, and delivering the reinforcer immediately following the emission of the desirable response.

To further minimize the probability of eliciting superstitious behaviors, it is advisable to utilize a continuous schedule of reinforcement during the first few sessions.

As training advances, social stimuli that have been paired repeatedly with the primary reinforcement since the early stages of training may be presented alone on an intermittent basis when the appropriate response occurs. Ferster & Skinner (1957) introduced a similar method called "percentage reinforcement", in which some kind of conditioned reinforcer (e.g., light, buzzer, noise, etc.) is presented several times between primary reinforcers through an increasing variable ratio schedule. Later during training the conditioned cue is used continuously without presenting the primary reinforcer. Finally the percentage of responses required to obtain the conditioned reinforcing stimulus is increased. Such a percentage reinforcement schedule could be used to establish praise as a conditioned reinforcer for speech deficient children.

Bijou & Sturges (1959) indicated that the following conditions should be taken into consideration when using reinforcers with children: (1) Before dispensing a certain type of stimulus as a reinforcer, it is important to find out from parents and/or custodians about their effectiveness as a reinforcer. This may save the therapist time since he

may be able to avoid trying different reinforcers until he finds the most appropriate one for his particular subject; (2) The suitability of the intended reinforcers for the age and economic class of the subject should be investigated; (3) Precise control over delivery of reinforcers should be gained before the training session begins; and (4) A complete description of the method of delivery and the nature of the reinforcer should be given. Commercially available reinforcers are preferred over homemade ones since they facilitate replication.

And finally, the establishment of effective reinforcers depends upon the particular characteristics of each subject. A reinforcer which is found to be strong for one child may be ineffective for another. Even food, which is thought to be the most universal reinforcer may under certain conditions be refused by some subjects (Wetzel et al, 1966).

Motivation

An important factor which may account for variation in effectiveness of methods of language training is what has been termed motivation. This refers to the maximum reinforcing value that stimuli acquire for an organism following deprivation of such stimuli. In speech training both the stimuli which serve as primary reinforcers and social stimuli may be withheld from the subject in order to increase their reinforcing properties. It has been established that food becomes a stronger reinforcer following a mild deprivation of about half a day. Thus, if a training session is scheduled around noon the child should be provided with only a very light breakfast. Likewise, the child should eat a very

light lunch if the session is to be held in the afternoon.

Sloane et al (1968) handled the motivation of their subjects during verbal training in the following way. When meals were used as reinforcers the sessions were held several hours after the previous meal, or as the first meal in the morning. Also the family of the child helped to deprive him, avoiding giving the child any kind of edibles which were going to be used as reinforcers in therapy sessions. For one child who was being controlled with social stimulation (social approval and attention), the sessions were preceded by five minutes of isolation in a high chair located in the same room that was used during the speech sessions.

Motivation control is particularly important when working with psychotic children. Hingtgen & Churchill (1968) think that "at least some of the behavioral deficiencies identified with infantile autism might be due to poor motivation for attending to appropriate cues (p. 1)." Metz (1965) was successful in controlling the motivational level of two schizophrenic children receiving training on imitation tasks by depriving them of their daily breakfast and giving them only the reinforcers earned during the experiments for their lunch.

Conclusion

Procedures used to administer reinforcers to non-verbal children may be either simple or complex, depending upon the characteristics of the child, the availability of the intended reinforcers, and the goals to be accomplished at various stages of treatment. If the speech

training program is to succeed, the behaviors to be reinforced must be clearly specified, the child sufficiently deprived of the reinforcer, and the reinforcer administered in a consistent manner. Hewett (1965) says,

> Gratification and control are basic ingredients in all effective learning situations. Children learn those tasks which prove rewarding and which are taught in a systematic and structured manner (pp. 928-929).

In the sections ahead, descriptions of practical situations in which reinforcers are manipulated differentially according to specific techniques and behavior problems will be discussed.

MODIFICATION OF INCOMPATIBLE BEHAVIORS

A problem that frequently arises during treatment of speech deficiencies, particularly while working with deviant children, is the child's engaging in behaviors which are incompatible with the behavior involved in speech training. The literature in behavior modification presents a learning theory rationale for the control of such behavioral disturbances, in addition to describing a wide variety of techniques for achieving the desired behavior change. This section summarizes the literature dealing with the more common disruptive behaviors found in speech treatment settings (inappropriate imitation of imitative stimuli, non-verbal vocalizations, temper tantrums, inappropriate crying, aggressiveness, self-injurious behavior, mannerisms, etc.). Such behaviors interfere with the efficiency of language training, and their frequency must be reduced or eliminated before significant progress can be achieved in the establishment of functional speech.

Extinction-Positive Reinforcement

A systematic extinction procedure used in conjunction with the systematic application of reinforcement upon the occurrence of adaptive responses has been successful in eliminating mild undesirable behaviors (McReynolds, 1969; Risley et al, 1967; Blackham & Silberman, 1971; Leff, 1968).

It is important to note that the effectiveness of extinction, which consists of removing or withholding the positive reinforcers, is

related to the strength of the reinforcers that are being removed. Thus, withdrawing food from a non-food deprived child constitutes a weak negative reinforcer, and may not result in a reduction of the disruptive behavior.

The extinction-positive reinforcement model involves two basic processes: (1) unlearning or reducing the strength of the undesirable behavior, and (2) learning or increasing the strength of the adaptive behavior.

Blackham & Silberman (1971) propose the following steps for the application of extinction-positive reinforcement: (1) Basic steps. Identification and establishment of the baseline frequency of occurrence of the behavior to be eliminated and/or changed; termination of all reinforcement for undesirable behavior; modification of the environment in such a way that the undesirable behavior will not be evoked; continuous reinforcement of desirable behavior, including approximations to the desired terminal behavior which may not yet exist in the child's behavioral repertoire; modification of the reinforcement schedule as desirable behavior replaces the undesirable behavior. (2) Procedures for implementing. Observation of the child in appropriate situations with a written description of the behavior to be eliminated or changed; withdrawal of all positive and negative reinforcers following inappropriate behavior; avoidance of placing the child in situations where the undesirable behavior will obviously occur; arrangement of situations for the occurrence of the desirable response; establishment of an intermittent schedule which becomes progressively more lean, e.g.,

reinforcement of every fourth, ninth, fourteenth, etc., desirable response. (3) Specific considerations and cautions. Statement of overt behavior to be eliminated and/or changed; extinguish undesirable behavior, except that time out might be used in a nonhostile way when the undesirable behavior is exhibited; recognition that undesirable behavior may occasionally increase in strength for a while, noting with certainty that the learned rewards being used are actually reinforcing, and if not replacing them with primary reinforcers; recognition that the time for the payoff rate of a variable ratio or interval schedule is dependent upon the rate of increase in frequency of the desired behavior.

Leff (1968) has summarized a study conducted by Lovaas and collaborators in which the effect of the therapist's attention on a child's disruptive behavior was reported. In that study it was demonstrated that increased attention in the form of sympathetic comments (e.g., "I don't think you are bad"), contingent upon the emission of self-destructive behavior, resulted in an increase of the magnitude and frequency of the undesirable behavior. On the other hand, reduction of such destructive behaviors was observed in those sessions in which the experimenter ignored the disruptive behavior.

Time-out

Time-out has been found to be an effective technique for reducing the frequency of some forms of incompatible behaviors emitted during speech training (Gray & Fygetakis, 1968; Jensen et al, 1967; Sailor et al, 1968). The basic reason for using the time-out technique is to

terminate all the positive reinforcers that the child usually receives. In this procedure either the therapist leaves the therapy room, the child is moved to an adjacent room, the child is moved to a corner of the therapy room, or he is placed in a large box immediately following the emission of the undesirable behavior. The time-out contingency should be administered immediately after the occurrence of the undesirable behavior.

If a room is used as the time-out stimulus, it should contain as few reinforcing stimuli as possible. It must be a well-lighted but relatively barren room, and the door should be kept closed. The child should be required to remain in the room until he is calm and quiet (Jensen & Womack, 1967), although some individuals prefer to limit the duration of the time-out situation to not more than 10 or 15 minutes (Blackham & Silberman, 1971).

Other Procedures

Most individuals working with speech problems prefer to apply the above described techniques for eliminating undesirable behaviors of children. However there are reports of successful treatment procedures in which stronger aversive stimuli have been used, some of which are summarized below.

Tate & Baroff (1966) eliminated the self-injurious behavior of a child over a period of 147 days, by administering a 0.5 second duration severe shock to the lower right leg, following each outburst of the child's self-destructive behavior.

Jensen & Womack (1967) modified the aggressive behavior of a six-year old autistic boy, by presenting contingent punishment consisting of a firm verbal No! and/or a brief restraint, or an immediate slap on the hand. The slap was not physically harmful and was used only occasionally. These authors comment that "this procedure was much more effective than verbal reasoning or explanations used by other staff dealing with such behaviors (p. 33)." Similar procedures have been used by Wetzel et al (1966).

Lovaas et al (1966) delivered punishment consisting of spanking and shouting, contingent upon the unattentive, self-destructive and tantrum behavior of two six-year old schizophrenic boys. As a result the unadaptive behaviors were suppressed within a week. These punishment procedures were carried out when the inappropriate behaviors interfered with verbal training, and after determining that the unadaptive responses could not be extinguished by withdrawal of positive reinforcement. The authors add that incorrect vocal responses were never punished.

Length of Application of the Techniques

The length of application of a given procedure depends on the effects that it produces on the child and the extent of success. With normal children behavioral changes are usually observed within a period of two weeks; however with deviant children, longer periods may be required.

In controlled environments, as soon as the child shows a change toward desirable behavior, the external contingencies begin to be more

positively reinforcing for the child. His less frequent undesirable behavior will result in greater staff attention towards him and more frequent prompts and reinforcement for engaging in appropriate behavior.

ATTENTION

Learning to speak initially is based on the imitation of a model's verbal behavior. The imitative responses of the subject are later converted into non-imitative ones. In the speech training of non-communicating children, imitation of the model's verbal stimuli becomes a necessary first step. The success of this step depends largely on the child's ability to attend to the model's cues.

A verbalization is made up of both acoustic and visual components. The acoustic element is the particular sound of the verbalization. The visual elements are the position and movements of the mouth and other facial expressions which occur during the vocalization. While visual attending to the acoustico-visual components of the model's vocalizations facilitates verbal discrimination, such discrimination is not likely to occur if the child attends to the acoustic element alone. Buddenhagen (1967) states that,

> Even where the relevant features of the stimulus are not visible to the subject, the correct response can often be prompted if the subject is attending to the observable aspects of the experimenter's mouth, jaw, tongue, and lip posture (p. 5).

Also Risley & Wolf (1967) state that the likelihood of the immediate occurrence of an imitative response increases when the child is looking at the therapist. On this matter Blake & Moss (1967) believe that eye contact is an important element in attention, and consider attention a necessary condition for shaping behavior. Therefore,

maintenance of the child's attention is an important preliminary step for functional language acquisition. It is particularly important that he attend to the relevant cues from the model's mouth.

If the child is still and his eyes are directly oriented toward the relevant teaching stimulus for the time during which it is presented then one may assume that he is attending. Some of the techniques currently used in eye contact training will now be reviewed.

Techniques for Eye Contact Training

If the child is able to imitate, then eye contact training is a simple matter. One procedure consists of an exchange of looks between the child and the therapist immediately after the subject is called by his name, and presented the stimulus "look at me". The usual reinforcer is delivered for appropriate looking responses. The length of the "staring" response is increased until it reaches the required duration.

Another commonly used method requires that the spoon or fork containing the primary reinforcer be held in front of the therapist's face. Since the child will tend to look at the food this also ensures that he will look in the direction of the therapist's face. As soon as this response occurs the therapist presents some kind of social reinforcement while extending the spoon toward the child's mouth. As the training progresses the child will look at the therapist's face more than at the food, and the position of the spoon or fork containing the food can be gradually faded away from the therapist's face.

Using a technique similar to the one described above, Schell et al (1967), working with a sorting task, manipulated an object (block)

in front of the subject in order to bring eye contact first to the block and later to the experimenter's face. The details of this procedure were as follows: At first the subject was required to reach for and grasp the block, thereby emphasizing the tendency to look where he reached. Since the block was held next to the experimenter's chin, the frequency of the subject's looking toward the experimenter's face and mouth was increased. Next, the child was required to bring the block toward himself, looking at it for a moment at eye level, and finally placing the block in its compartment. At this stage the subject received a piece of candy, a smile, and praise.

Blake & Moss (1967) trained a girl to make eye contact using a teaching booth similar to the one designed by Hewett (1965) for teaching speech to autistic children. Initially, the subject (Dolly) was in total darkness. Every five seconds the experimenter opened the shutter and turned on the lights, saying at the same time "Hi, Dolly, look at me!" Almost always Dolly would be looking in the experimenter's direction, and she would be rewarded for doing so by giving her a spoonful of ice cream. If the subject was looking elsewhere, the shutter was dropped for 15 seconds. Only a few trials were required for Dolly to look directly toward the experimenter's eyes. After 75 trials all responses to the command "look at me" were correct. The authors indicated that there was no problem with the girl's making eye contact after the 75th session.

In working with autistic or severely retarded children one gets the impression that these children usually do not pay attention, even

when called by name. Thus, working with such people generally requires the introduction of physical prompts for shaping eye contact, such as holding the child's face in order to increase the probability of eye contact. As training progresses the physical prompt is gradually faded out.

Several studies conducted by Lovaas show the effectiveness of physical constraint and guidance in developing eye contact behavior in schizophrenic children. In one of these studies the experimenter and the subject sat facing each other with their heads about 30 centimeters apart. In order to prevent the child from leaving this situation the experimenter held the child's legs between his legs. The child received a bite of his regularly scheduled meal after making appropriate eye contact responses. With such a procedure the child could avoid eye contact with the experimenter only by closing his eyes or turning his head (Lovaas et al, 1966).

Using a similar procedure, Bry & Nawas (1972) trained retarded children to attend by calling the subjects by their names and immediately orienting their faces toward the experimenter's face. This procedure was continued until the children learned to turn their heads toward the experimenter without physical guidance following the enunciation of their names.

A final example illustrates further application of eye contact training procedures based on the reviewer's own experience at Charles D. McIver School in Greensboro, North Carolina. The subject, Timmy, was a six-year old mentally retarded non-talking boy. During the initial

assessment it was established that Timmy's attention span was too short and that his attention was obtained inconsistently upon calling him by name. If an attentional response occurred, it did not last longer than about two seconds. Moreover, he looked around frequently and turned his body around on his chair while babbling to himself. For this reason eye contact was shaped before proceeding with verbal training.

Both the therapist and Timmy sat on small chairs with Timmy directly in front of the therapist. In order to avoid Timmy's turning around on his chair, the therapist held Timmy's legs between his knees. At first the therapist called Timmy by his name and waited for the appropriate looking response. As soon as the response occurred the therapist delivered the primary reinforcement (a piece of marshmallow, potato chip, or sweet cereal) paired with some form of social stimulation, e.g., saying "good, Timmy" and patting him on the shoulder. In the early trials Timmy turned his head away as soon as he received the reinforcer. Therefore the therapist held Timmy's head and delivered the reinforcer upon eye contact resulting from the therapist's command "Timmy, look at me". In subsequent trials the reinforcer was delivered only after prolonged periods of time when Timmy stared at the therapist's face without the necessity of a prompt. This training procedure proved successful in that Timmy learned to look continuously at the therapist upon his command. Eye contact was no problem during the later stages of the training program.

Physical Arrangement

Another factor to consider in controlling the child's attention during speech training is the physical arrangement of the therapy setting. A child's attention can be controlled more effectively when the therapy sessions are carried out in a room that does not contain distracting stimuli, but only the items used in the particular tasks to be learned. The room should contain only the necessary furniture, including two chairs (one for the therapist and one for the child) and one desk or table of the appropriate height for the chairs.

The arrangement of the table and the chairs depends on the technique being applied. The chairs may be placed at adjacent sides of the table, or opposite one another. An additional table or chair located close to the therapist may sometimes be needed for displaying items to be used as reinforcers.

The visibility of the primary reinforcer to the subject may facilitate training, since the subject may be more highly motivated to perform appropriately due to his expectation of what he might receive for doing so. However, displaying the reinforcer seems to distract some children's eye contact away from the therapist's face.

When the subject receives eye contact training using the Lovaas method described above, the table between the therapist and the child is omitted. By omitting the table the therapist is able to bring the subject closer to him, thereby facilitating the physical prompts and permitting restraint of the child's legs between the therapist's legs.

The importance of an adequate physical arrangement is summarized in the following statement by Risley & Wolf (1967):

> In a room where the child may reach for, throw, or destroy many items, turn on and off light switches and climb on furniture, the therapist may inadvertently train the child to engage in these behaviors, since they must be attended to by the therapist. For some children with high rates of tantrums and disruptive behavior, the rooms have been entirely cleared except for the chairs and tables which have been secured to the floor (p. 75).

SYSTEMATIC OBSERVATION AND RECORDING OF BEHAVIOR

An important component of behavior modification is the observation and recording of the behavior for which a change is desired. Such observation and recording is necessary in order to specify the exact behaviors to be modified and to establish a baseline or operant level during the pretreatment condition. A continuous recording of the observed behavior throughout the course of therapy permits feedback to the clinician about the effectiveness of the techniques being applied, and thus enables an evaluation of the child's progress. Finally, by comparing posttreatment measures with initial data the therapist can assess the effectiveness of the treatment.

In speech therapy a direct and systematic observation of the verbal behavior of the child provides an objective evaluation of the subject's actual verbal repertoire. It provides exact information regarding the antecedent and consequent conditions that control the child's use of language which may not be revealed by subjective measures or standardized tests. These preliminary observational data are important for structuring a remedial language program.

In addition to facilitating specification of the language deficits and speech treatment program, observational records also provide measures of the responses of the child during the course of training. Systematic observation may also be extended to the natural environment of the child in order to obtain information for evaluating the

generalization of the newly acquired language skills outside the speech therapy room.

Classes of Responses to be Recorded

The behavior to be observed and recorded varies from one child to another during any stage of speech training. For example, the behaviors observed in establishing a baseline may include the following: verbal responses to certain stimulus objects; imitation of speech sounds; responses to verbal cues presented by the therapist; free verbalizations and relevant stimuli that appear to control the child's free speech; and the verbal repertoire of the child in the natural environment, i.e., home, school, playing yard, etc.

Autistic or psychotic children usually show a lack of appropriate imitative capabilities. Since they must learn to imitate before proceeding with verbal tasks, during the initial assessment it is necessary to observe and record the extent of their imitative repertoires.

Data taken from a study conducted by Hingtgen et al (1967) exemplify the kinds of responses that may be observed and recorded during the baseline and posttreatment assessment in psychotic children receiving speech therapy. Hingtgen et al's test was made up by 39 responses which were grouped according to three categories of imitation: (1) use of body, (2) use of objects, and (3) vocal responses. Specific responses observed in each of these categories were as follows:

1. Use of body. Clap hands, touch nose, pat head, arms up, arms out, touch foot, cross feet, run, jump, march, tongue out, blink, smile,

blow, open mouth, chew, kiss, and move nose.

2. Use of objects. String beads, build tower, throw ball, push truck, draw line, fold paper, cut with scissors, ring bell, button, brush teeth, and hook car.

3. Vocal responses. Muh, buh, puh, oh, wuh, ah, ee, you, I, and duh.

The training procedure was carried out as follows: The experimenter was seated facing the child. He modeled each imitative response three times and waited up to ten seconds for the response of the child. If the child responded to any modeled response with a close approximation to it, within the ten-second interval, his response was scored as correct. The experimenter used verbal approval following each correct response and primary reinforcement intermittently.

Techniques for Observing and Recording Verbal Behavior

Most importantly, the verbal deficit should be specified in empirically meaningful terms in order to permit measurement and identification of specific verbal responses when they occur during training. Since the stimulus environment influences the rate of the response being measured, the behavioral definition of verbal deficits should contain a description of the actual conditions under which the verbal behavior is measured. This description should include the antecedent stimulus events, the particular response being elicited, and the consequent stimulus events.

An inaccurate specification of the pretraining verbal deficit does not permit any posttreatment response changes to be attributed to the treatment procedures. Furthermore, an imprecise and inaccurate analysis of the initial verbal deficit could result in inconsistent and inadequate reinforcement procedures, thereby reducing the speed of learning. An inadequate specification of the verbal deficit also may cause long delays in the delivery of reinforcement due to the therapist's not being sure whether or not the child's verbalization belongs to the response class previously "specified" for reinforcement. As previously explained, long delays of reinforcement are relatively inefficient in a learning situation, particularly during the early stages of training.

An important factor that should be considered in behavioral definitions is the establishment of criteria which will permit several observers to agree on the occurrence of the behavior of concern. For example, if one desires to check the number of times a child babbles to himself the criteria used for apecifying the response "babbling to himself" must make it distinguishable to all observers from other vocal responses and non-verbal expressions similar to babbling.

The criteria for recording the occurrence of the behavior should take into account the external contingencies which control the behavior. This is beneficial in establishing coding systems consisting of symbols and definitions for categorizing specific behaviors. The observers should be thoroughly trained in the use of the coding system. Implementation of the coding system and the method for training observers will be described later.

Observing and Recording

Johnston & Harris (1968) describe three ways in which data on speech training can be collected in a clinical setting: (1) The therapist can record the data himself during speech sessions, (2) a tape recorder can be used during the sessions and the data transcribed later, and (3) a trained observer can record data on each session.

1. Records kept by the therapist. It seems that this is the least adequate method for collecting data in a language therapy program, because it involves extra work by the therapist who must also administer the speech program and control the behavior of the child during therapy sessions. Such division of attention may produce unsatisfactory results during training. Furthermore, the observations may lack objectivity. Still another shortcoming is that this procedure provides only partial information about the behavior of the child and the behavior of the therapist during the therapy sessions. It does not permit the recording of information about the non-verbal behavior of the child, nor about his spontaneous verbalizations. Information about the therapist's interactions with the child and any mistakes or deviations from the original plan are not recorded. This makes it difficult to evaluate the program and to identify and correct problems which may arise during the course of training.

2. Tape recording. The use of tape recorders during speech training sessions has many advantages: The tape records both the verbal behaviors of the child and that of the therapist; the sessions can be monitored any time by the therapist or by other persons interested in the

procedures of the speech therapy program; and the accuracy of the data provided serves as evidence of the child's progress. Tape recorders also record particular features of the child's vocalizations such as loudness or changes in intonation and articulation that otherwise would be lost information. Tape recordings also enable a second person to code the verbal material furnished by the tape.

The exclusive use of tape recordings has some disadvantages. First, do not record the non-verbal behavior of the child. Using tape recordings is also time consuming, because the tapes must be replayed for transcribing the information in written form. While tape recorders help the therapist in observing and recording verbal behavior, they should be used as a supplement to direct observation and not a substitute.

3. Observations made by trained observers. This has been the most satisfactory method for recording verbal behavior in treatment settings and in the natural environment. The data furnished by this method is frequently more reliable than the previously described techniques for recording verbal behavior.

The particular procedures used by the observers are determined by the verbal deficit under treatment. However, there exist some general steps that observers should follow in any setting. Before starting the observations the observer establishes the number of trials, the length of the recording intervals, the coding system used to designate specific behaviors, and the notations to be made during the observations. Usually the observer has an especially prepared recording sheet which is

divided into squares representing intervals. Then the observer places in each square the symbol or symbols that indicate the responses occurring in that interval.

Reynolds & Risley (1968) recorded the type and frequency of verbalization of a child during free play activities using the following methods: (1) Recording how often the child spoke. The rate of verbalizations was recorded during several ten-second intervals by writing down a letter "T" in each interval during which verbalizations occurred. (2) Recording exactly what the child verbalized. Everything the child said during a 15-minute period was written down.

Reynolds & Risley also recorded the verbal responses according to the person to whom they were directed, as well as the kind of speech of the child used in the verbal interaction (nouns and verbs). New verbs and nouns pronounced by the child were recorded and served to determine the increase in target verbal behavior.

Desirable Conditions for Observing and Recording

In clinical settings facilities for observing and recording verbal responses should include a room equipped with a one-way mirror and a microphone connected to an observation booth.

Another method of observation involves the presence of the observer in the room in which the observations are made. When using this procedure the observer must try to avoid any kind of interactions with the subject being observed. If the observer is successful in doing this, any response of the child toward the observer will soon be extinguished.

Reliability Observation

A precautionary measure which is commonly carried out with trained observers is to check their reliability. This method consists of simultaneous observations and recordings of behavior by two or more observers. All observers receive training in the measurement procedures before the reliability observations are implemented.

In observation by trials, the degree of agreement between two or more observers can be presented in numerical form by calculating the percentage of agreement, based on recordings for the total number of trials. During time-interval observations, both the new observer and his reliability checker must be certain that the child's behavior observed by them is the same during each specific interval. This is accomplished by making sure the observations are begun at the same time.

Observer disagreements may be due to inadequacies in the observation code, differences in training of observers, or in the method of calculating reliability (Bijou, Petterson, & Ault, 1968). In general, any lack of comprehension and specificity of definitions in the observational code can be solved by using mutually exclusive categories in the code. Training of observers might start by familiarizing them with the equipment which is going to be used during observations such as stop watches and data sheets. Next they should receive instructions on the use of the code, followed by practice in the field in recording gross behavioral patterns, and later, in recording more complex behaviors which require finer discriminations. The presentation and discussion of films and video tapes constitute supplementary training devices.

Instruction in avoiding interactions with the target child, including ignoring questions, avoiding eye contact, and avoiding reacting to the child's activities should be given. Training also should include how to change positions in the observation room without affecting the child's behavior.

Concerning reliability, Bijou et al (1968) present an example which shows how a measure of reliability might become meaningless. They say that if two observers have recorded data on the same class of events in a given period of time, and if the sum of events recorded by each of them are unequal, the smaller number may be divided by the larger to yield a "percentage of agreement" index. Equal sums would yield a reliability index of 100. Such calculation provides information only on frequencies without indicating whether the two observers were actually recording the same event at the same time. Also, it could happen that one observer recorded more responses than the other in a given moment during the observation period. The shortcomings of this method may be overcome, according to these authors, by dividing the length of the observation period into small segments and calculating the reliability over each. Agreement over progressively smaller segments increases the probability that both observers are recording the same behavior at approximately the same time.

Variations in the frequency of the behavior being observed may influence the reliability index measure. For example, if responses occur at very low rates, the observers will record relatively few occurrences and many non-occurrences. Thus, if both observers disagree on

an "occurrence", this will have little effect on the overall index of reliability because of the high agreements in "non-occurrence". For this reason a separate reliability determination should be calculated for each individual response measure.

PART II

IMITATION TRAINING

The word imitation identifies a class of behavior emitted by an organism resembling the characteristics of behavior exhibited earlier by another organism acting as a model. Garcia et al (1971) state that any individual's behavior can be identified as imitative if it temporally follows the behavior of another individual, and if its topography is dependent upon the demonstrated behavior. In other words, after witnessing a model's response the observer makes a response that resembles that of the model. Such resemblance between both behaviors differentiates imitation from other behaviors that might occur in the presence of the model.

Gewirtz et al (1968) point out that Miller & Dollard considered as relevant factors for imitation "the individual's capacity to learn to imitate and environmental conditions that have positively reinforced him for such learning (p. 376)." Most of the child's learning is accomplished through the imitation of others' behavior. Lovaas et al (1967) have stressed the importance of imitation through the developmental process of normal children. According to these authors the acquisition of complex forms of behavior is facilitated through imitation of such behaviors from other persons. Therefore, because imitation is so important in the process of socialization and language development, the acquisition of an imitative repertoire is a basic prerequisite to the implementation of a language training program.

Imitation training consists of reinforcing a response made by the child only when that response immediately follows the same or similar response made by the therapist (Risley et al, 1967). However, the terminal behavior expected from imitation training is the establishment of an imitative response class or generalized response class of imitation. Learning a class of imitative responses becomes a necessary prerequisite for the introduction of classes of verbal responses (Nelson, 1969).

The importance of establishing a response class of imitation for the acquisition of new behaviors is demonstrated by findings of experimental studies. It has been shown that by developing a class of imitative responses in a child, other new responses falling within the class can be acquired without shaping them directly. These studies also have shown that if reinforcement is made contingent upon an imitative response, then other imitative behaviors may be maintained without a direct reinforcing contingency (Brigham & Sherman, 1968; Baer & Sherman, 1964).

According to Gewirtz (1968) generalized imitation has been acquired ". . . when many different responses of a model are copied in diverse situations, often in the absence of extrinsic reinforcement (p. 375)." In other words, according to Nelson (1972) a generalized response class of imitation has been learned if a child will make an imitative response to an imitative stimulus when this particular stimulus-response combination has never been specifically taught.

The general procedure for training a class of imitative responses, whether motor or verbal, consists of the following steps: First, the

child's response is elicited by the therapist's presentation of an imitative stimulus along with a discriminative verbal stimulus (S^D) such as "do this", "watch me", "try this", "say . . .", etc. Then, when members of the response class are elicited they are followed immediately by reinforcement.

Risley and Wolf (1967) refer to the use of discriminative stimuli in imitation training, pointing out that imitation must reliably occur immediately after a prompt in the form of a word or phrase is presented before significant advances in speech occur.

During the first stages of imitation training the primary reinforcement is presented through a continuous schedule. As imitation progresses the primary reinforcement is delivered through an intermittent schedule, while social reinforcement may still be presented continuously for an additional period of time.

It should be noted that some children with serious behavioral disturbances, e.g., autism and schizophrenia, do not have the ability to perform imitative responses when verbal prompts alone are used. Therefore, other training methods must be used. Regarding this matter, Lovaas et al (1967) say:

> When one works with schizophrenic children one cannot merely provide appropriate models engaging in desired behavior and expect these children to acquire that behavior. With such a procedure one finds that schizophrenic children fail to imitate the attending adult. In fact, the children with whom we have worked have even failed to attend to, or orient toward the adult models; they have behaved as if they were 'blind and deaf' (p. 172).

When imitation is being taught to a child who possesses little or no imitative behavior, the response must be elicited through a physical

prompt by the therapist. After the presentation of the imitative stimulus, and the prompt, the response is reinforced. The physical prompt is gradually reduced while the child improves his performance. Finally the only stimulus for eliciting the child's response is the imitative stimulus provided by the therapist. The same procedure is applied to other responses within the same response class. Once the imitative responses are elicited, they are extrinsically reinforced if similar to those exhibited by the model.

In order to acquire the response class of imitation the subject must respond appropriately to the introduction of new imitative stimuli called probes. He must also maintain an imitative performance without being extrinsically reinforced for every imitative response, although at least some responses of the response class will be maintained by extrinsic reinforcement.

The procedure described above has been used successfully in teaching both non-vocal and vocal responses. Imitation training in speech therapy involves several stages which go from non-verbal to verbal tasks, including gross motor, fine motor, facial and verbal imitation. For example, initial imitations may consist of closing a door, jumping, hand clapping, touching the floor, raising one arm, moving shoulders, etc. Later imitative behavior may consist of moving the head, the jaw, the mouth; lip pursing; tongue wiggling; and blowing. Finally, the imitative training is shifted to imitation of sounds, basic phonemes, words, etc.

The rationale underlying the sequential imitative steps discussed above is described by Stark et al (1968). They point out that the transition from non-verbal imitation to vocal responses is accomplished by gradually directing the discriminative stimulus toward the face and mouth. Vocal imitation starts when the child is able to imitate more discrete motor movements, particularly oral movements.

The level at which imitation training should begin depends upon the specific deficit of the child under treatment. Thus, children who can imitate verbally usually do not have to be given non-verbal imitation training (Stark et al, 1968). If the child already has a given behavior in his repertoire, it might be important to bring such randomly or spontaneously occurring behavior under imitative control by reinforcing it when it occurs following the presentation of a model stimulus or prompt by the therapist (Risley et al, 1967).

Specific procedures and other aspects of non-vocal and vocal imitation training are reviewed in the next two sections.

NON-VOCAL IMITATION TRAINING

If the child does not have an adequate repertoire of speech sounds, or if he does not readily imitate speech sounds, then imitation training should start by introducing simple motor responses, such as standing up, hand clapping, arm raising, etc. The therapist presents the command "do this" just before modeling the imitative response. Reinforcement is delivered to any approximation of the correct response. However, if the child does not imitate the model appropriately, then the therapist physically moves the child through the desired behavior and delivers the reinforcer after completion of that motion. A second therapist might carry out the physical prompt, while the first therapist models the imitative stimulus and presents the generalized S^D for the imitative behavior (Nelson, 1972).

For example, the hand clapping response could be trained in the following way: While one therapist stands in front of the child and claps his own hands together, another therapist, while standing behind the child, physically prompts the response by holding the child's hands, bringing them together and releasing them upon impact. In subsequent trials, the therapist would gradually fade out the guidance, decreasing his active participation in the child's response, until the child is capable of producing the response alone. Lovaas et al (1967) point out that "it appears that this procedure causes the child's behavior to shift in its stimulus control; initially controlled by the prompt, the

behavior later comes under the control of the adult's modeling behavior (p. 174)."

Shaping is involved in making the imitative response approach that modeled by the therapist. The shaping procedure consists of reinforcing those behaviors which resemble or have some common characteristics with the desired terminal behavior. As shaping progresses, the behavioral limits are narrowed in successive approximations by delivering the reinforcer only to those responses that more closely resemble the behavior modeled by the therapist. Once the terminal behavior is reached, the child is reinforced only for precise responses.

Researchers have recently conducted studies in which the above method has been used successfully in motor imitation training. One such study is that of Baer et al (1967) who applied the following procedure to one of their subjects. The first response to be trained was the raising of an arm after the experimenter raised his. The experimenter modeled "arms-raising" several times; each act being accompanied by the words "do this" to which the child did not respond. The experimenter again demonstrated the response, but this time he took the child's hand and raised it and reinforced the subject by saying "good" and giving him a bite of food. After several such trials the experimenter started gradually to fade out the physical prompt by lifting the subject's arm only part way and shaping the completion of the response. The reduction of physical guidance continued until the child made an unassisted arm-raising response whenever the experimenter raised his arm. Baer et al point out that in the later procedures, shaping was continued when a response did not match the demonstration.

Lovaas et al (1967) explain that their method was based mainly on initial prompting, continuous food reinforcement for correct behavior, subsequent fading of prompts, and shifts to partial reinforcement. In their procedure the experimenter modeled the desired behavior and waited five seconds for the child's response. If the subject did not exhibit the desired behavior within that time period, the experimenter prompted the response. The prompts consisted of physically moving the child through the desired behavior. For example, in the "placing a ball in a cup" response, the experimenter would take the child's hand with the ball and move it towards the cup, and by releasing his grip on the child's hand cause the ball to fall within the cup. The experimenter faded out the prompt by lessening his hold on the child's hand, then merely touching the child's hand, then his elbow, then his shoulder, and finally only emitting the behavior to be imitated.

A final example of the technique commonly used in motor imitation training consists of a report of sessions 11 through 20 of a treatment program implemented by Blake & Moss (1967) with an electively mute child. During these sessions, about 80 per cent of all disruptive behavior had been eliminated so that new behavior could be attempted more easily. The hand-clapping response was taught through the fading technique. In the beginning, the experimenter would clap his hands and proceed to put the subject's hands through the motions of hand clapping. Soon the experimenter had only to lift the child's hands in the air about a foot apart and let go, and the child would close them herself. Gradually the experimenter was able to shift the responsibility for executing the

hand-clapping response from himself to the child. Eventually the experimenter had only to say "clap your hands" and the subject would comply, thereby obtaining a reward.

A particular imitative response is considered learned if it is under the experimenter's control and if it is a precise reproduction of that of the model. Only when this stage is reached in imitation of a given response can the training be transferred to a second response of the same response class.

The second motor response of a given class must be clearly discriminable from the first one. For example, if "hand-clapping" was taught first, the second motor response might be "standing up". The teaching procedures used are the same as before: The therapist says "do this" and then stands up. Then he, or a second therapist, guides the child to the standing up response. Immediately the first therapist delivers the reinforcer. As soon as the second imitative response is introduced, imitation training should be concentrated exclusively on this new response. That is, further training on the first response is avoided (Nelson, 1972). Later when the second response has been mastered, the child should learn to discriminate between both responses. The first and the second responses are modeled randomly by the therapist, each paired with the enunciation of the command "do this" and the child reinforced for correct imitations.

Once the child has learned to discriminate between the first and the second tasks, other motor responses are then taught, introducing finer motor responses that gradually approach the head and vocal area.

The last motor imitation tasks should be similar in topography to those required for the production of speech. These latter behaviors involve movements of the mouth and associated structures, such as jaw moving, placing the teeth on the lower lip, protruding and wiggling the tongue, etc. In order to facilitate the discriminability among the non-verbal responses, the models should exaggerate the natural positions and movements of the vocal apparatus.

Motor imitation training might require many trials of the same motor response before the child is able to master the target response. Also, it might be necessary to introduce many responses of the same response class before he is able to imitate correctly a motor response presented for the first time by the model.

VOCAL IMITATION TRAINING

The first stages of vocal imitation training overlap with the more advanced stages of motor imitation concentrated in the area of the mouth. Gross sounds are used as imitative stimuli in conjunction with motor responses of the mouth. For example, the imitative stimulus "opening mouth" might be paired with the sound "ahh".

The earlier stages of vocal imitation training stresses bringing the child's spontaneous sounds under stimulus control, given that the child has already acquired the ability to imitate motor responses of the mouth. Initially the child may not produce any sound when the therapist models the vocal imitative responses. If this is the case, the therapist seeks to maximize their occurrence, either through the use of prompts or by bringing the child in contact with environmental conditions in which the vocal response is likely to occur.

Schell et al (1967) report a case of mutism in which a physical prompt was used as a device for facilitating the production of sounds. Both the experimenter and the child sat facing each other about one and a half feet apart. The subject was required to open his mouth in an "O" shape upon the therapist's modeling of it. During the first trials the therapist prompted the subject to open his mouth by holding his chin and cheek and pulling to force the mouth open. The physical prompt was gradually faded out, and on the fifteenth trial the child started to open his mouth without guidance. Since the child occasionally made sub-

glottal" and "aspirate" sounds when he opened his mouth, the therapist took advantage of these uncontrolled sounds and worked to make them more like the vowel sound "a". They state: "This required a great deal of prompting. As he imitatively opened his mouth, the clinician pushed his abdomen to force a vocalization. At the same time, the clinician made the sound 'a' (p. 58)." Next, as soon as the child uttered "any sound", the therapist produced the "a" sound adding the social stimulus "yes, good boy" paired with a piece of candy. When the subject only opened his mouth without uttering any sound there was no comment made by the clinician, nor was a piece of candy delivered as a reinforcer.

Other procedures used by the same authors with the same child consisted of deliberately arranging play activities. For example, the clinician prompted laughs, giggles, and smiles by tickling the child and laughing along with him. Other play activities were implemented, always making the subject utter sounds appropriate to each activity. Schell et al's approach was effective for increasing the frequency and variety of the child's vocalizations and for bringing them under precise stimulus control. The criteria for selecting these vocal imitative stimuli for the subject were based on: (1) sounds that had easily discriminable features which could be contrasted easily; (2) sounds emitted by the child during spontaneous play; (3) sounds that could be prompted by manipulating the tongue, lips, and jaw; and finally, (4) sounds known to be capable of articulation by normal children. The sounds so selected were introduced in a hierarchy of gradually increasing complexity (Stark et al, 1968).

Hingtgen et al (1967) trained a non-verbal autistic child to imitate a blowing response in preparation for the production of the sound "puh". The subject had been seen blowing spontaneously but not by imitation of a model. He also blew a harmonica in imitation of a model in another part of the imitation training program. The procedure consisted of having him imitate blowing on a large toy harmonica until a consistent imitation of this response was obtained. In subsequent trials the clinician pulled the harmonica slightly away from the subject's mouth so that he was required to blow harder to obtain musical tones. In the next steps of training the therapist took the child's hand and blew on it asking the client to imitate this response. When the sound "puh" was shaped it was then easily sequenced into the word "puppy".

Lovaas et al (1966) have reported a discrimination training procedure which they found to be feasible for training verbal imitation in schizophrenic children. They described the technique as follows:

> Early in training the child was rewarded only if he emitted a sound within a certain time after the adult had emitted a sound. Next he was rewarded only if the sound he emitted within the prescribed interval resembled the adult's sound. Toward the end of training he was rewarded only if his vocalizations very closely matched the adult's vocalization, that is, if it was in effect imitative. Thus verbal imitation was taught through the development of a series of increasingly fine discriminations (p. 705).

When shaping imitative vocal responses initially, it may be necessary to reinforce any spontaneous vocalization. Then the therapist should progressively reinforce open or closed mouth sounds. The limits of the child's vocalizations are narrowed until only those verbal responses resembling the terminal vocal imitative stimulus are reinforced.

Early training may include prompts by positioning the child's mouth or using sounds that have clear visual components on the therapist's face (Churchill, 1969).

After the child has learned to imitate gross sounds, e.g., puh, wuh, muh, buh, oh, ah, duh, etc., he is then taught the basic phonemes, e.g., b, c(k), d, f, g, h, j, l, m, n, p, r, s(c), t, v, w, z, ch, sh, and th. Training in the pronunciation of basic phonemes requires antecedent cues that maximize the probability of each consonant sound being reinforced. These cues are made up of auditory, visual, and tactile components. The child is able to hear the sound emitted by the therapist. His visual attention is directed toward the therapist's vocal apparatus while the latter is enunciating the phonemes. The child may touch the therapist's vocal apparatus as well as his own at the time of presentation of the imitative sound.

Physical prompts have a double function in phonemical training: first they guide the vocal apparatus toward the appropriate movements for uttering phonemes; and second, they may be used as discriminative stimuli for each phoneme. As usual, the prompts are gradually faded out by moving the therapist's fingers away from the mouth of the child, until the phonemes are elicited by the child each time the therapist enunciates them.

Some antecedent cues commonly used to elicit the pronunciation of the basic phonemes are as follows:

Phoneme	Antecedent cues
b	Make a fist and place it gently over the lips; blow it away.
c(k)	Place the child's index finger under his chin while his other hand touches the therapist's throat.
d	The therapist taps his teeth with three fingers.
f	Visual components are stressed by placing the front teeth over the bottom lip.
g	The child's one hand touches his throat while the other hand touches the therapist's.
h	The therapist blows on the child's hand, while the child blows on his own hand.
j	The visual components are stressed. The therapist opens his mouth and places his teeth together in exaggerated fashion.
l	The therapist opens his mouth for making visible the action of his tongue against the roof of his mouth.
m	The child's lips are held together.
n	The child places index finger on the side of the therapist's nose.
p	Have the child hold his finger over his lips and blow away as an imitation of the same response modeled by the therapist.
r	The therapist opens his mouth to display a vibrating tongue.
s(c)	The visual components are stressed as the therapist opens his mouth to display closed teeth.
t	The same as "d" but this time the therapist taps his teeth with one finger.
v	The same as "f".
w	The same as "h".
z	The same as "s".
ch	The same as "j".

Phoneme	Antecedent cues
sh	The same as "j".
th	The therapist places his tongue between his teeth in an exaggerated manner while pronouncing the "th" sound.

Blends, Tacts, and Mands

When the child has acquired the basic phonemical repertoire, the next step consists of chaining phonemes together (blending) in order to shape a meaningful word which the child can use in his natural environment. At this level a new discriminative stimulus is introduced. The command "say . . ." is used instead of the former "do this" which is more appropriate for motor tasks.

A further step is verbal labeling, in which the child learns by imitation to name or "tact" common objects, taking care to introduce one object at a time and proceeding with a new one until the actual object's name has been mastered. Finally the child learns to request, or "mand".

Blends, tacts, and mands can be sequenced upon the same object stimuli. Sloane, Johnston, & Harris (1968) trained a child to name (tact) the reinforcer (water) used in speech therapy sessions. The reinforcer was made contingent upon the subject's pronunciation of the word "water". A glass of water was held up and presented when the response "water" was emitted.

A Final Word

Verbal training goes beyond the stages described in this report, involving even more complex verbalizations and techniques for eliciting

them. However, verbal training beyond these preliminary steps may proceed rapidly since the elementary imitative verbal repertoire has already been acquired.

SUMMARY

Based on the principles of social learning theory, this paper has reviewed the clinical techniques typically employed in the preliminary steps for the acquisition of functional language in non-verbal children. Psychological research supporting the effectiveness of these techniques was also reviewed.

The review was concerned with the following basic preliminary steps of speech therapy and their theoretical basis:

1. It was assumed that verbal behavior can be established by the imitation of others' verbal behavior, and hence non-communicating children should learn to imitate, first non-verbal behavior, and later verbal responses. The importance of establishing a generalized response class of imitation for insuring progress in the acquisition of verbal behavior was stressed.

2. Speech acquisition in the clinical setting is related to precise and consistent contingencies for the child's responses. Thus the child receives positive consequences for appropriate responses and negative consequences for undesirable behavior.

3. Incompatible behaviors occurring in speech therapy sessions reduce the effectiveness of training procedures and interfere with progress in the speech training program; therefore, any incompatible behaviors should be eliminated as soon as they arise.

4. The establishment and maintenance of the child's attention is necessary for learning to speak in clinical settings. The child must be taught to attend to the relevant characteristics of imitative stimuli modeled by the clinician. This most frequently involves the establishment of eye contact behavior.

5. The behavioral approach to speech problems is concerned with the objective measurement of observable data. The effectiveness or ineffectiveness of treatment procedures is determined by measurement of changes in verbal responding which occur as a result of the implementation of treatment procedures.

Functional language acquisition in the clinical setting assumes that the child has an adequate physiological functioning for hearing, producing sounds, and for visually attending to the relevant cues provided by the therapist. Beyond these physiological limitations the production of verbal responses depends upon the adequacy of the speech therapy program.

The therapist should begin language training at the appropriate level, and from there move ahead step-by-step toward the terminal behavior of functional language. The progression in small steps provides the child with the necessary skills for his advancement toward the terminal behavior. Therefore, the strategy of the therapist in speech training, as in other applied fields of behavior modification, is based on the analysis of the terminal behavior, the child's initial behavioral repertoire, and particular requirements of each step of training.

A further arrangement for insuring progress in language learning is the extension of stimulus control to the natural environment of the child in order to facilitate the carry over of speech improvements from the clinic to the natural daily life.

Finally, it should be mentioned that some theorists, particularly linguists, are skeptical about the primary role of imitation in language acquisition (Guess et al, 1968). It is argued that conditioning of individual verbal responses is not related to the formation of the basic structure for the development of language, and therefore such a system of treatment might result in a stereotyped "parrot-like" language (Gray, 1970).

Studies conducted in the area of speech acquisition show that children can learn a wide vocabulary through the application of operant principles. Even though such studies provide optimistic results, they do not determine if the amount of verbal learning is comparable to that of normal verbal children living in natural conditions. Moreover, there are other areas of language development that remain to be demonstrated by learning principles. For example, the role of differential reinforcement and imitation control in the establishment of morphology and syntax has yet to be systematically explored.

The application of learning principles to the area of speech, as mentioned in the introductory section, is of recent appearance, and still there are several questions in the matter which remain to be answered in the years ahead. Linguistics might provide the operant researcher with the basis for determining the critical language units and

the order in which they should be conditioned into the behavioral patterns of the child.

BIBLIOGRAPHY

Baer, D. M. & Sherman, J. A. Reinforcement control of generalized imitation in young children. J. of Exp. Child Psychology, 1964, 1, 37-49.

Baer, D. M., Peterson, R. F., & Sherman, J. A. The development of imitation by reinforcing behavioral similarity to a model. J. of Exp. Analysis of Beh., 1967, 10, 405-416.

Baer, D. M. & Wolf, M. M. Recent examples of behavior modification in preschool settings. In Neuringer, Ch. & Michael, J. L. (Eds.), Behavior Modification in Clinical Psychology. New York: Appleton-Century-Crofts, 1970, Pp. 10-25.

Bandura, A. & Harris, M. Modification of syntactic style. J. of Exp. Child Psychology, 1966, 4, 341-352.

Bijou, S. W. & Sturges, P. T. Positive reinforcers for experimental studies with children--Consumables and manipulatables. Child Development, 1959, 30, 151-170.

Bijou, S. W. & Baer, D. M. Operant methods in child behavior and development. In Honig, W. K. (Ed.), Operant Behavior: Areas of Research and Application. New York: Appleton-Century-Crofts, 1966, Pp. 718-789.

Bijou, S. W., Peterson, R. F., & Ault, M. H. A method to integrate descriptive and experimental field studies at the level of data and empirical concepts. J. of App. Beh. Analysis, 1968, 1, 175-191.

Blackham, G. J. & Silberman, A. Modification of Child Behavior. Calif.: Wadsworth Publishing, 1971.

Blake, P. & Moss, T. The development of socialization skills in an electively mute child. Beh. Res. and Therapy, 1967, 5, 349-356.

Brigham, T. & Sherman, J. An experimental analysis of verbal imitation in preschool children, J. of App. Beh. Analysis, 1968, 1, 151-158.

Brison, D. W. A non-talking child in kindergarten: an application of behavior therapy. J. of School Psych., 1966, 4, 65-69.

Brookshire, R. Speech pathology and the experimental analysis of behavior. J. Speech Hearing Dis., 1967, 32, 215-227.

Bry, P. M. & Nawas, M. M. Is reinforcement necessary for the development of generalized imitation operant in severely and profoundly retarded children? Amer. J. of M. Deficiency, 1972, 76, 658-666.

Buddenhagen, R. G. On the importance of visual attending in the shaping of vocal verbal behavior in non-talking children. Paper presented at A. P. A., 1967.

Catania, A. Ch. Contemporary Research in Operant Behavior. Illinois: Scott-Foresman, 1968.

Churchill, D. W. Psychotic children and behavior modification, Amer. J. of Psychiatry, 1969, 125, 1585-1590.

Cook, Ch. & Adams, H. E. Modification of verbal behavior of speech deficient children. Beh. Res. and Therapy, 1966, 4, 265-271.

Craigh, H. B. & Holland, A. Reinforcement of visual attending in classrooms for deaf children. J. of App. Beh. Analysis, 1970, 3, 97-109.

Davison, G. C. A social learning theory programme with an autistic child. Beh. Res. and Therapy, 1964, 3, 149-159.

Davison, G. C. The training of undergraduates as social reinforcers for autistic children. In Ullmann, L. P. & Krasner, L. (Eds.), Case Studies in Behavior Modification. New York: Holt, 1965, Pp. 146-148.

Erickson, M. T. Modification of multiple behavior problems with the mother as therapist. Unpublished paper. Child Development Institute, University of North Carolina, 1968.

Fernandez, L. E. & Liebert, R. M. Vicarious reward and task complexity as determinants of imitative learning: a modified replication. Psych. Reports, 1970, 26, 473-474.

Ferster, C. B. & Skinner, B. F. Schedules of Reinforcement. New York: Appleton-Century-Crofts, 1957.

Fineman, K. R. Visual-color reinforcement in establishment of speech by an autistic child. Percep. Motor Skills, 1968, 26, 761-762.

Garcia, E., Baer, D. M., & Firestone, I. The development of generalized imitation within topographically determined boundary. J. of App. Beh. Analysis, 1971, 4, 101-112.

Gewirtz, J. & Stingle, K. Learning of generalized imitation as the basis for identification. Psych. Review, 1968, 75, 5, 374-397.

Gray, B. B. Language acquisition through programmed conditioning. In Bradfield, R. H. (Ed.), Behavior Modification the Human Effort. Calif.: Dimensions Publishing, 1970, Pp. 99-122.

Gray, B. B. & Fygetakis, L. Mediated language acquisition for dysphasic children. Beh. Res. and Therapy, 1968, 263-280.

Guess, D. A. Functional analysis of receptive language and productive speech: acquisition of the plural morpheme. J. of App. Beh. Analysis, 1969, 2, 55-64.

Guess, D., Sailor, W., Rutherfore, G., & Baer, D. An experimental analysis of linguistic development: the productive use of the plural morpheme. J. of App. Beh. Analysis, 1968, 1, 297-306.

Heller, K. & Marlatt, G. Verbal conditioning, behavior therapy and behavior change: some problems in extrapolation. In Franks, C. M. (Ed.), Behavior Therapy: Appraisal and Status. New York: McGraw-Hill, 1969, Pp. 569-588.

Herrstein, R. J. Superstition: a corollary of the principles of operant conditioning. In Honig, W. K. (Ed.), Operant Behavior: Areas of Research and Application. New York: Appleton-Century-Crofts, 1966, Pp. 33-51.

Hewett, F. M. Teaching speech to an autistic child through operant conditioning. Amer. J. Orthopsychiat., 1965, 35, 927-936.

Hingtgen, J. N. & Churchill, D. W. Differential effects of behavior modification in four mute autistic boys. Indiana U. Colloquium on Infantile Autism, 1968.

Hingtgen, J. N. & Coulter, S. K. Auditory control of operant behavior in mute autistic children. Percep. Motor Skills, 1967, 25. 561-565.

Hingtgen, J. N. & Trost, F. C. Shaping cooperative responses in early childhood schizophrenics: II. Reinforcement of mutual physical contact and vocal responses. In Ulrich, R., Stachnic, T. & Mabry, J. (Eds.), Control of Human Behavior. Chicago: Scott-Foresman, 1966, v. 1, Pp. 110-113.

Hingtgen, J. N., Coulter, S. K., & Churchill, D. W. Intensive reinforcement of imitative behavior in mute autistic children. Arch. Gen. Psychiat., 1967, 17, 36-43.

Holland, A. Some applications of behavioral principles to clinical speech problems. J. Speech Hearing Dis., 1967, 32, 11-18.

Holtz, W. C. & Azrin, N. H. Conditioning human verbal behavior. In Honig, W. K. (Ed.), Operant Behavior: Areas of Research and Application. New York: Appleton-Century-Crofts, 1966, Pp. 790-826.

Isaacs, W., Thomas, J., & Goldiamond, I. Application of operant conditioning to reinstate verbal behavior in psychotics. J. Speech Hearing Dis., 1960, 25, 8-12.

Jensen, G. D. & Womack, M. G. Operant conditioning techniques applied in the treatment of an autistic child. Amer. J. Orthopsychiat., 1967, 37, 30-34.

Johnston, M. & Harris, F. R. Observation and recording of verbal behavior in remedial speech work. In Sloane, H. N. & MacAulay, B. (Eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton-Miffling, 1968, Pp. 40-60.

Kanfer, F. H. & Saslow, G. Behavioral Diagnosis. In Franks, C. M. (Ed.), Behavior Therapy: Appraisal and Status. New York: McGraw-Hill, 1969, Pp. 417-444.

Leff, R. Behavior modification and the psychoses of childhood. Psych. Bulletin, 1968, 69, 396-409.

Liebert, R. M. & Fernandez, L. E. Effects of vicarious consequences on imitative performance. Child Development, 1970, 41, 847-852.

Lovaas, O. I. A program for the establishment of speech in psychotic children. In Sloane, H. N. & MacAulay, B. (Eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton-Miffling, 1968, Pp. 125-154.

Lovaas, O. I., Berberich, J. P., Perloff, B. F., & Schaeffer, B. Acquisition of imitative speech in schizophrenic children. Science, 1966, 151, 705-707.

Lovaas, O. I., Freitas, L., Nelson, K., & Whalen, C. The establishment of imitation and its use for the development of complex behavior in schizophrenic children. Beh. Res. and Therapy, 1967, 5, 171-181.

MacAulay, B. A program for teaching speech and beginning reading to non-verbal retardates. In Sloane, H. N. & MacAulay, B. (Eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton-Miffling, 1968, Pp. 102-124.

McReynolds, L. V. Operant conditioning for investigating speech sound discrimination in aphasic children. J. Speech Hearing Research, 1966, 9, 519-528.

McReynolds, L. V. Application of time-out from positive reinforcement for increasing the efficiency of speech training. J. of App. Beh. Analysis, 1969, 2, 199-205.

Metz, J. R. Conditioning generalized imitation in autistic children. J. Exp. Child Psychol., 1965, 2, 389-399.

Miller, G. A. Some preliminaries to psycholinguistics. Amer. Psychology, 1965, 20, 15-20.

Nelson, R. Complex response classes: criticisms and defense. Advanced Behavior Modification Seminar, 1969.

Nelson, R. Suggestions for language training of non-verbal children. Unpublished paper. Dept. of Psychology, UNC at Greensboro, 1972.

O'Brien, F., Azrin, N. H., & Bugle, C. Training profoundly retarded children to stop crawling. J. of App. Beh. Analysis, 1972, 5, 131-137.

Odom, R., Liebert, R., & Hill, J. The effects of modelling cues, reward, and attentional set on the production of grammatical and ungrammatical syntactic constructions. J. Exp. Child Psychol., 1968, 6, 131-140.

Patterson, G. R., Jones, J. W., & Wright, M. A. A behavior modification technique for the hyperactive child. Beh. Res. and Therapy, 1965, 2, 217-226.

Peterson, R. Imitation: a basic behavioral mechanism. In Sloane, H. N. & MacAulay, B. (Eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton-Miffling, 1968, Pp. 61-74.

Peterson, R. Some experiments on organization of a class of imitative behaviors. J. of App. Beh. Analysis, 1968, 1, 225-235.

Raph, J. Language and speech deficits in culturally disadvantaged children: implications for the speech clinician. J. Speech Hearing Dis., 1967, 32, 203-214.

Reynolds, N. J. & Risley, T. The role of social and material reinforcers in increasing talking of a disadvantaged preschool child. J. of App. Beh. Analysis, 1968, 1, 253-262.

Rheingold, H., Gewirtz, J. L., & Ross, H. Social conditioning of vocalization in the infant. J. Comp. Physiol. Psychol., 1959, 52, 68-73.

Risley, T. & Hart, B. Correspondence of non-verbal and verbal behavior. J. of App. Beh. Analysis, 1968, 1, 267-281.

Risley, T. & Wolf, M. Establishing functional speech in echolalic children. Beh. Res. and Therapy, 1967, 5, 73-88 (a).

Risley, T. & Wolf, M. Experimental manipulation of autistic behaviors and generalization into home. In Bijou, S. W. & Baer, D. M. (Eds.), Child Development: Readings in Experimental Analysis. New York: Appleton-Century-Crofts, 1967, Pp. 184-194 (b).

Sailor, W., Guess, D., Rutherford, G., & Baer, D. M. Control of tantrum behavior by operant techniques during experimental verbal training. J. of App. Beh. Analysis, 1968, 1, 237-243.

Salzinger, K. The place of operant conditioning of verbal behavior in psychotherapy. In Franks, C. M. (Ed.), Behavior Therapy: Appraisal and Status. New York: McGraw-Hill, 1969, Pp. 375-395.

Salzinger, S., Salzinger, K., Portnoy, S., Eckman, J., Bacon, P., Deutsch, M., & Zubin, J. Operant conditioning of continuous speech in young children. Child Development, 1962, 33, 683-695.

Schell, R., Stark, J., & Giddan, J. Development of language behavior in an autistic child. J. Speech Hearing Dis., 1967, 32, 51-64.

Shatin, L. Contributions of clinical psychology to the process of speech therapy. Br. J. Disorders of Communic., 1967, 2, 73-77.

Sherman, J. A. Use of reinforcement and imitation to reinstate verbal behavior in mute psychotics. J. of Abnormal Psychol., 1965, 70, 155-164.

Skinner, B. F. Verbal Behavior. New York: Appleton-Century-Crofts, 1957.

Sloane, H. N., Johnston, M., & Harris, F. Remedial procedures for teaching verbal behavior to speech deficient or defective young children. In Sloane, H. N. & MacAulay, B. (Eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton-Miffling, 1968, Pp. 77-101.

Sloane, H. N. & MacAulay, B. Teaching and the environmental control of verbal behavior. In Sloane, H. N. & MacAulay, B. (Eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton-Miffling, 1968, Pp. 3-18.

Stark, J., Giddan, J., & Meisel, J. Increasing verbal behavior in an autistic child. J. Speech Hearing Dis., 1968, 33, 42-48.

Steinman, W. M. The social control of generalized imitation. J. of App. Beh. Analysis, 1970, 3, 159-167.

Stilwell, W. E. Using behavioral techniques with autistic children. In Krumboltz, J. D. & Thoresen, C. E. (Eds.), Behavioral Counseling: Cases and Techniques. New York: Holt-Rinehart-Winston, 1969, Pp. 193-200.

Straugham, J. The application of operant conditioning to the treatment of elective mutism. In Sloane, H. N. & MacAulay, B. (Eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton-Miffling, 1968, 242-255.

Tate, B. G. & Baroff, G. S. Aversive control of self-injurious behavior in a psychotic boy. Beh. Res. and Therapy, 1966, 4, 281-287.

Todd, G. A. & Palmer, B. Social reinforcement of infant babbling. Child Development, 1968, 39, 591-596.

Ullmann, L. P. & Krasner, L. A Psychological Approach to Abnormal Behavior. New Jersey: Prentice-Hall, 1969.

Weiner, A. E. Speech therapy and behavior modification: a conspectus. J. of Special Education, 1969, 3, 285-293.

Weisberg, P. Social and non-social conditioning of infant vocalizations. Child Development, 1963, 34, 377-388.

Weiss, H. H. & Born, B. Speech training or language acquisition? A distinction when speech training is taught by operant conditioning procedures. Amer. J. Orthopsychiat., 1967, 37, 49-55.

Wetzel, R. J., Baker, J., Roney, M., & Martin, M. Outpatient treatment of autistic behavior. Beh. Res. and Therapy, 1966, 4, 169-177.

Wilson, F. S. & Walters, R. H. Modification of Speech output of near-mute schizophrenics through social-learning procedures. Beh. Res. and Therapy, 1966, 4, 59-67.

Wolf, M., Risley, T., & Mees, H. Application of operant conditioning procedures to the behavior problems of an autistic child. Beh. Res. and Therapy, 1964, 1, 305-312.

Wolf, M., Risley, T., Johnston, M., Harris, F., & Allen, E. Application of operant conditioning procedures to the behavior problems of an autistic child: a follow up and extension. Beh. Res. and Therapy, 1967, 5, 103-111.

Yates, A. J. Behavior Therapy. New York: John Wiley, 1970.